

ISS National Laboratory

CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE

# ISS U.S. NATIONAL LABORATORY

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# ISS NATIONAL LAB MISSION

CASIS manages the International Space Station National Laboratory as a public service in order to benefit the U.S. taxpayer and to foster a scalable and sustainable low Earth orbit economy.

We leverage our core competencies, facilitate public-private partnerships, and utilize the platform capabilities and unique operating environment of the space station.

We create demand, incubate in-space business ventures, provide access for and awareness of fundamental science and technological innovation, and promote science literacy of the future workforce.



# HOW WE DO IT

*In partnership with NASA*

**CASIS enables and facilitates:**

- In-space R&D expertise to assist researchers in utilizing in-space laboratory assets
- Access to space via multiple launch providers
- Seed money and partnerships to fund research projects and product development
- Market discovery and demand generation for ISS National Lab resources
- Administrative support (accelerating/streamlining historically long wait times to conduct space-based research)
- Educational outreach projects and curricula to teach and inspire students across the country through its STEM education programs

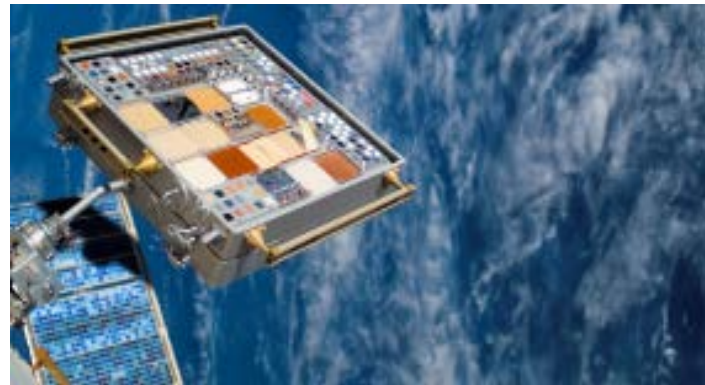
# WHY SPACE?

## Persistent Microgravity



- Lack of density gradients
- No convection
- Uniform surface wetting
- Multiphase flow dynamics
- No sedimentation
- Reduced interfacial tension
- Different solidification

## Extreme Conditions



- 500°F orbital heat cycling
- Ultrahigh vacuum
- High-energy radiation
- Atomic oxygen
- High-energy impact

## Unique Vantage Point



- 250 miles above Earth
- Orbital path: 90% of population
- Spatial resolution
- Sun cycling/light conditions
- Remote sensing
- Satellite deployment



# COLLABORATION

Implementation Partners work with the ISS National Lab and researchers to:

- Translate projects for ISS hardware and facilities run by Commercial Service Providers
- Design hardware components
- Aid in the execution of projects on station

**38** Implementation Partners

**17** Commercial facilities run by 10 Commercial Service Providers



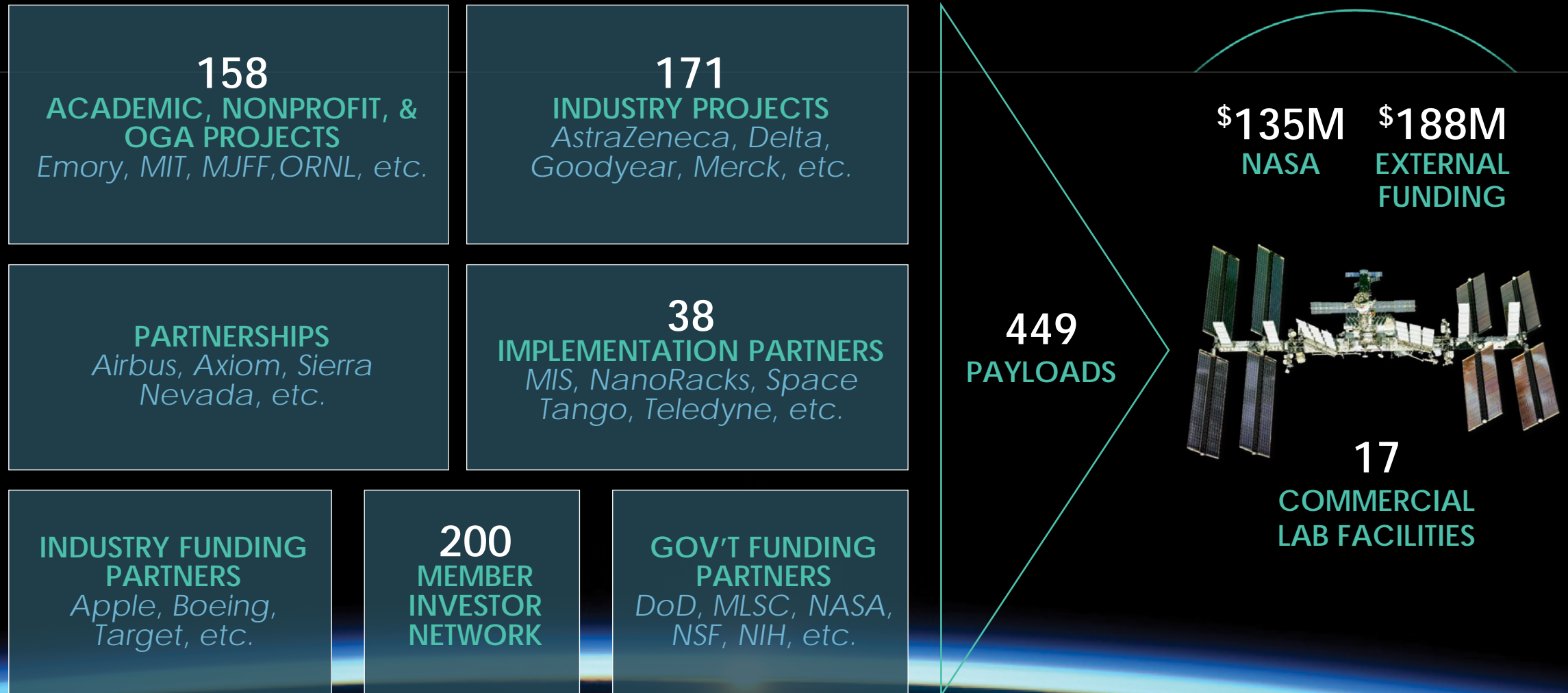


# OUR EXPERIENCE

CASIS has a decade of experience:

- **Managing the ISS National Lab:** Enabling access for U.S. companies, organizations, and researchers to utilize research facilities and commercial implementation services in space
- **Building and maintaining relationships:** Establishing strong relationships with companies and government agencies whose R&D benefits from utilization of the ISS
- **Selecting and managing a diverse R&D portfolio:** Selecting projects that take advantage of the unique environment of space to conduct research that benefits the nation
- **Evolving strategic priorities and direction** based on past data/results, market prospecting, evolving R&D demand and investment, and national interests

# ISS NATIONAL LAB ECOSYSTEM



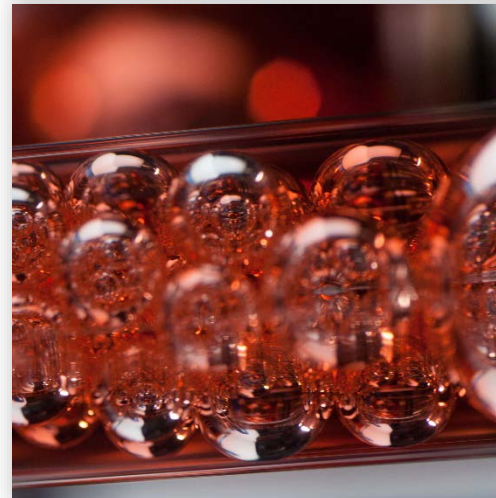
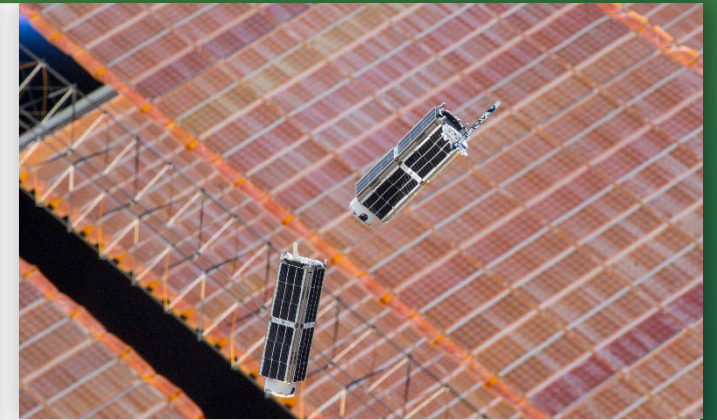
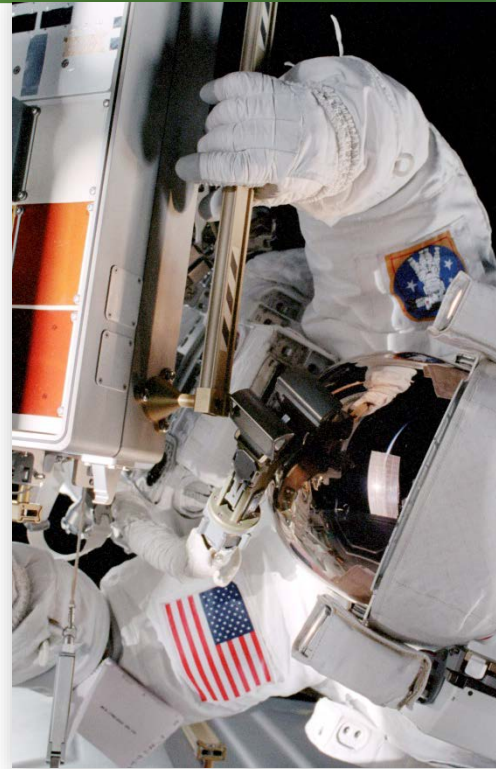






# LINES OF BUSINESS

- In-Space Production Applications
- Fundamental Science
- Technology Development & Demonstration
- Commercial Service Provider Utilization
- STEM Engagement & Educational Outreach





# ADVANCED MATERIALS

Absence of gravity or exposure to extreme conditions can alter fluid behavior and certain materials, enabling the development of advanced materials and better manufacturing processes for use on Earth and in space.



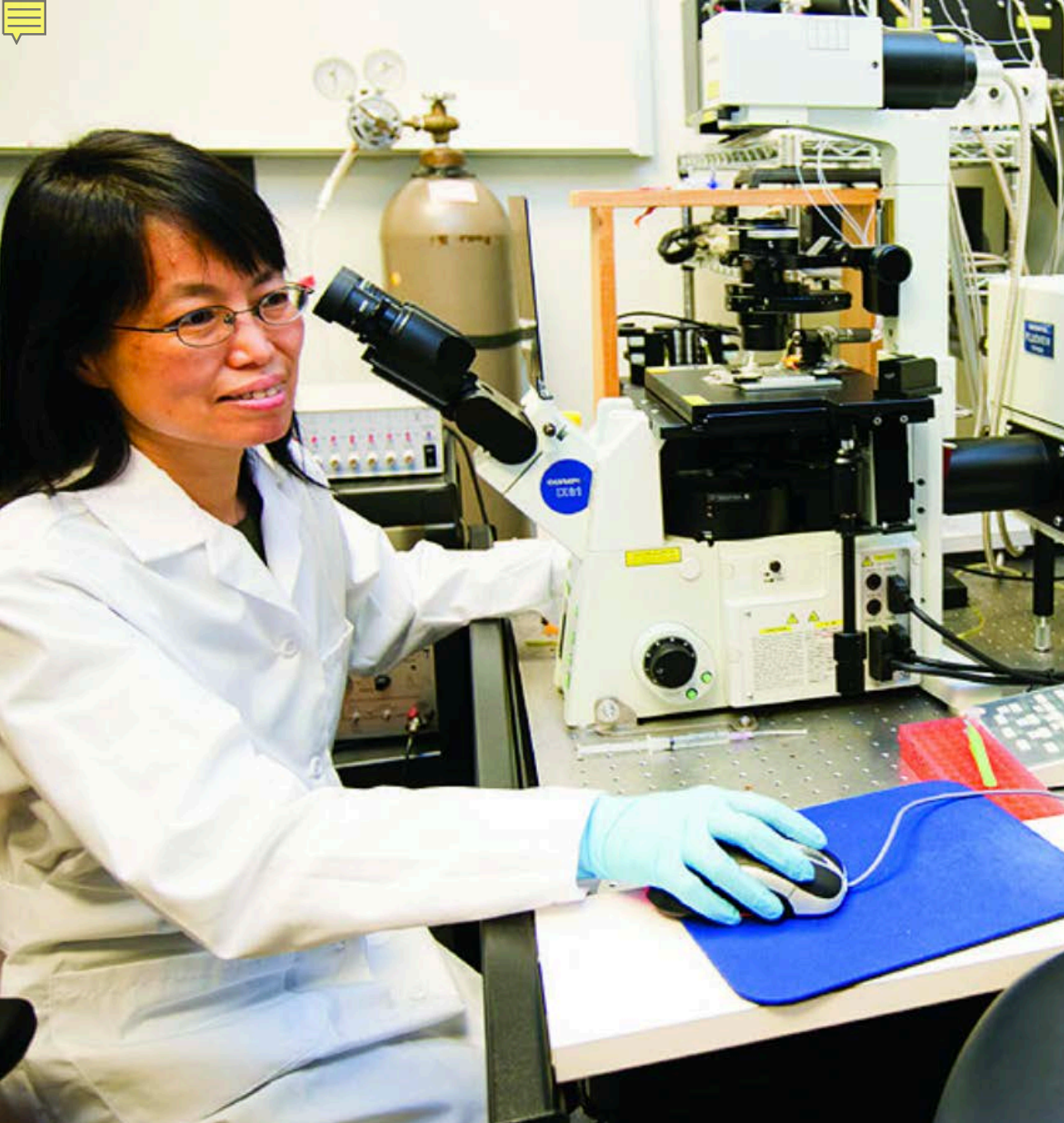


# EXOTIC GLASSES & OPTICAL FIBERS

Several companies are revolutionizing in-orbit production of fluoride glass optical fibers that may enable wavelength-specific applications in medicine and defense, in addition to a new class of fiber formulations for communications

ZBLAN  
 $\text{ZrF}_4\text{-BaF}_2\text{-LaF}_3\text{-AlF}_3\text{-NaF}$





# REGENERATIVE MEDICINE

Microgravity may enhance some properties of stem cells, such as their ability to survive, proliferate, form 3D aggregates, and differentiate—which could provide significant benefits in advancing personalized medicine and developing stem cell-based regenerative therapies.

# TISSUE ENGINEERING

Tissue engineering has many applications but often includes culturing tissues resembling those in the body to:

- Model human disease,
- Allow higher-accuracy drug testing, or
- Advance research in organ growth, toward addressing the shortage of organs for transplantation





# COMMERCIAL SERVICE PROVIDER UTILIZATION

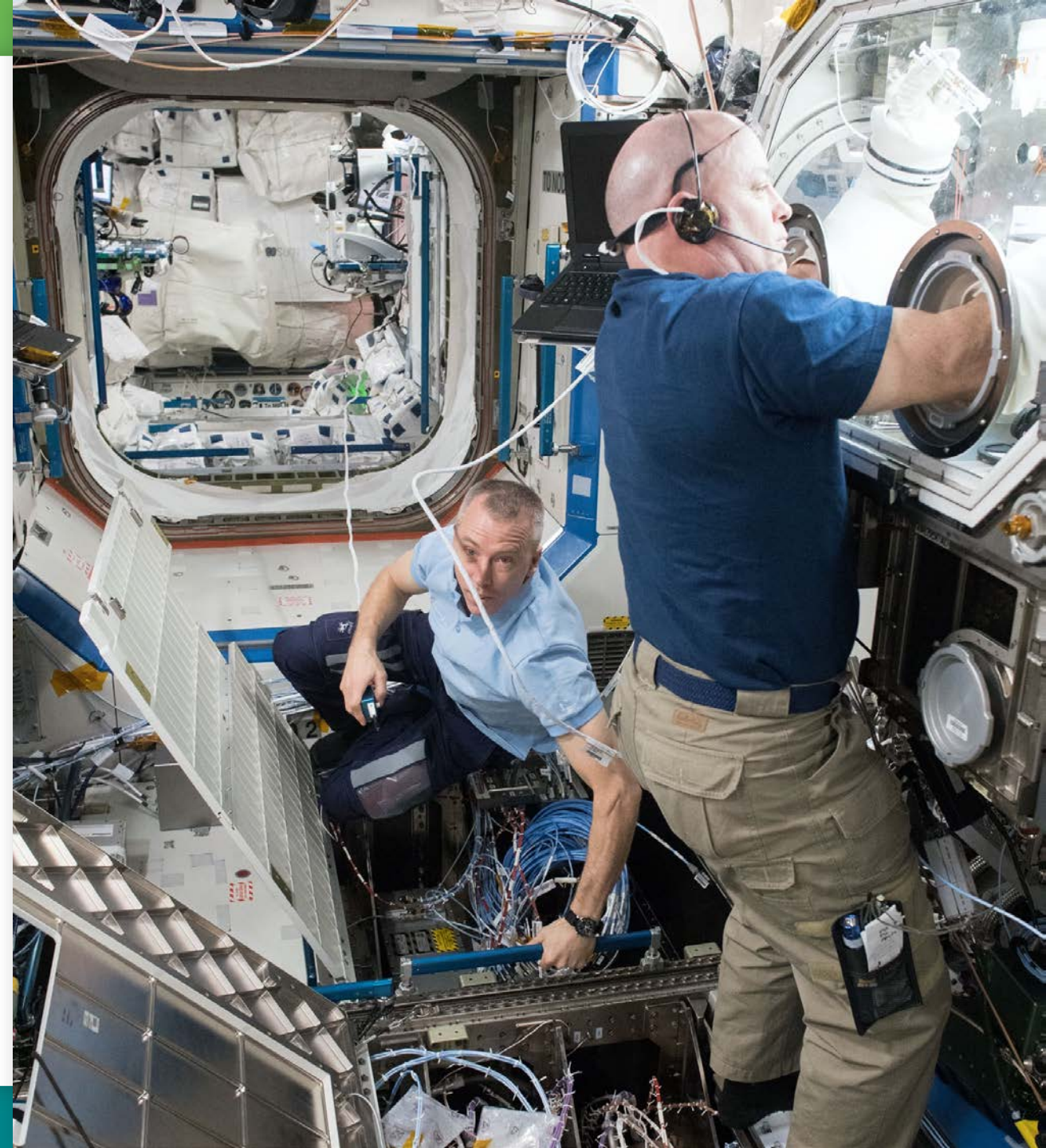
Projects developed by  
Commercial Service Providers  
for the purpose of promoting,  
enabling, and facilitating their  
respective commercial demand-  
generation efforts.





# RESEARCH ON STATION IN 2021 & BEYOND

- Research proposals will be accepted through **ISS National Lab Research Announcements**
  - Technology Development
  - In-Space Production
  - STEM
- Through **Sponsored Programs** (NIH, NSF, etc.)
- Through **Commercial Service Providers**





# THANK YOU

Support the growth of a robust  
economy in low Earth orbit!

[www.ISSNationalLab.org](http://www.ISSNationalLab.org)



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CENTER FOR THE ADVANCEMENT OF  
**SCIENCE IN SPACE**

*Uluru, or Ayers  
Rock, a massive  
sandstone  
monolith in the  
heart of Australia's  
Northern Territory's  
arid "Red Centre"  
as seen from the  
ISS.*



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